## REMARKS

Claims 1, 3, and 5-6 are pending in this application. By the Office Action, claims 1, 3 and 5-6 are rejected under 35 U.S.C. §112 and 35 U.S.C. §103. By this Amendment, claim 1 is amended. Support for the amendments to claim 1 can be found in the specification as originally filed, such as at paragraphs [0043]. No new matter is added.

Entry of this Amendment is proper under 37 C.F.R. §1.116 because the Amendment places the application in condition for allowance (for the reasons discussed herein) or places the application into better form for Appeal should an Appeal be necessary. The Amendment does not present any additional claims without canceling a corresponding number of finally rejected claims, does not raise the issue of new matter, and does not raise any new issues requiring additional search and/or consideration since the Amendment is directed to subject matter previously considered during prosecution. Furthermore, the amendments are necessary and were not earlier presented because they are in response to issues raised in the Final Rejection. Applicants respectfully request entry of the Amendment.

I. Rejections Under §112

Claims 1, 3 and 5-6 are rejected under 35 U.S.C. §112, first paragraph, as not being enabled by the specification as filed. Applicants respectfully traverse this rejection with respect to the amended claims.

The Office Action asserts that the claims are broader than the enabling scope of the specification. Specifically, the Office Action argues that while the specification enables specific processing conditions for the modified cerium oxide, such as the use of inert gas and atmospheric pressure at a temperature of 10-95°C, the specification does not enable all processing conditions of the modified cerium oxide. Applicants respectfully submit that the pending claims are fully enabled by the specification.

As presented, claim 1 specifies that the cerium(IV) oxide is obtained by blowing oxygen or a gas containing oxygen into a suspension obtained by reacting a cerium (III) salt with an alkaline substance in a $(OH)/(Ce^{3+})$ molar ratio of 3 to 30, in an aqueous medium in the presence of an ammonium salt having a non-oxidative anionic component selected from the group consisting of ammonium carbonate, ammonium hydrogen carbonate, and mixtures thereof. Such limitations are fully supported by the specification as filed.

Under the law relating to 35 U.S.C. §112, the written description must communicate that which is needed to enable the skilled artisan to make and use the claimed invention. Kennecott Corp. v. Kyocera International Inc., 5 USPQ2d 1194, 1197 (Fed. Cir. 1987). An invention may be described in different ways and still be the same invention. Id. The test for enablement is whether one reasonably skilled in the art could make or use the invention from the disclosures in the patent coupled with information known in the art without undue experimentation. United States v. Telectronics, Inc., 8 USPQ2d 1217, 1223 (Fed. Cir. 1988). Based on these principles, Applicants submit that the specification fully supports the application.

In particular, the specification provides at least two mechanisms whereby the cerium (IV) oxide can be obtained from a cerium (III) salt and an alkaline substance. For example, the specification at paragraph [0013] describes a first production method for producing "particularly preferable" materials, where a cerium (III) salt is reacted with an alkaline substance in a $(OH)/(Ce^{3+})$ molar ratio of 3 to 30 in an aqueous medium under an inert gas atmosphere to form a suspension of cerium (III) hydroxide; and immediately thereafter oxygen or a gas containing oxygen is blown into the resulting suspension at atmospheric pressure at a temperature of 10 to 95°C; meanwhile, paragraph [0033] describes a second production method for producing materials, where a cerium (III) salt and an alkaline substance are reacted in a $(OH)/(Ce^{3+})$ molar ratio of 3 to 30 in an open air to produce a suspension of cerium hydroxide and a second step in which oxygen or gas containing oxygen

is blown into the resulting suspension at an atmospheric pressure at a temperature of 10 to 95°C. These methods thus use different atmospheres (inert gas or open air), contrary to the assertions in the Office Action. The first method describes the use of atmosphere pressure, while the second method is silent as to pressure. Both methods state a temperature range of 10 to 95°C. However, as expressly stated in paragraph [0013] these conditions are only used to produce "particularly preferable" materials, and the specification does not disclose that the production is limited to only these two processes.

One of ordinary skill in the art would readily recognize that these and other methods could be used to produce the cerium (IV) oxide, and would understand that the present claims are fully enabled by the specification. Accordingly, the claims satisfy the requirements of 35 U.S.C. §112, first paragraph. Reconsideration and withdrawal of the rejection are respectfully requested.

II. Rejections Under §103

Claims 1, 3 and 5-6 are rejected under 35 U.S.C. §103(a) over Kasai in view of Yoshida and Khaladji. Applicants respectfully traverse this rejection with respect to the amended claims.

A. The Claimed Invention

The claimed invention is directed to a method for polishing a glass hard disk platter, comprising polishing a glass hard disk platter using a stable slurry in which cerium(IV) oxide particles having an average secondary particle size of 0.1 to 0.5 μm are dispersed in water, which contains $CeO_2$ in a concentration of 0.2 to 30 wt%, and contains a quaternary ammonium ion ($NR_4^+$, where R is an organic group) in a $(NR_4^+)/(CeO_2)$ molar ratio in a range of 0.001 to 1, wherein a proportion of cerium expressed as a ratio of (cerium oxide)/(cerium oxide + other rare earth oxides) in the cerium(IV) oxide particles is 95% or more based on weight, and the stable slurry is a slurry of surface-modified cerium(IV) oxide

obtained by heat-treating cerium(IV) oxide that is obtained by blowing oxygen or a gas containing oxygen into a suspension obtained by reacting a cerium (III) salt with an alkaline substance in a $(OH)/(Ce^{3+})$ molar ratio of 3 to 30, in an aqueous medium in the presence of an ammonium salt having a non-oxidative anionic component selected from the group consisting of ammonium carbonate, ammonium hydrogen carbonate, and mixtures thereof. Such a method is nowhere taught or suggested by the cited references.

The claimed invention thus relates to a method for polishing a glass hard platter using a specific surface-modified cerium(IV) oxide. The cerium(IV) oxide is made by reacting a cerium (III) salt with an alkaline substance to form a suspension, and then oxygen or a gas containing oxygen is blown into the resulting suspension to obtain cerium(IV) oxide, and thereafter the cerium(IV) oxide is heat-treated in the presence of an ammonium salt having a non-oxidative anionic component. The claimed method using the claimed cerium(IV) oxide slurry provides a good glass hard platter surface having less unevenness due to a chemical/mechanical effect. The claimed method is particularly suitable and advantageous for uses that require precision polishing. See specification at paragraph [0071].

The claimed invention specifies that the slurry contains a quaternary ammonium ion, $NR_4^+$ where R is an organic group, in a $(NR_4^+)/(CeO_2)$ molar ratio in a range of 0.001 to 1. By adding such a quaternary ammonium ion, the stability of the abrasive liquid is improved. See specification at paragraph [0043].

In addition, the claimed invention enables a polishing speed, and a ratio of polishing speed to average surface roughness, to be increased. This is accomplished by adjusting an abrasive compound such that cerium accounts for 95% or more in terms of oxides of the total amount of rare earth elements in the abrasive compound for polishing the glass disc platter. As a result, the claimed invention allows for improved productivity and reduced cost of the polishing step. See specification at paragraph [0073].

These benefits are specifically disclosed and described in the specification. For example, Table 1 at page 15 of the specification shows the polishing speed and average surface roughness of Examples 1-4 as compared to the Comparative Example 1. In Examples 1-4, where cerium accounts for 95% or more in terms of oxides of the total amount of rare earth elements in the abrasive compound, the abrasive compound provides significantly reduced average surface roughness and increased ratio of polishing speed to average surface roughness, as compared to Comparative Example 1, where cerium accounts for less than 95% (specifically 57%) in terms of oxides of the total amount of rare earth elements in the abrasive compound. These Examples and Comparative Example demonstrate the unexpected results obtained when the cerium(IV) oxide content is within the claimed range (Examples 1-4) as compared to when the cerium(IV) oxide content is outside of the claimed range (Comparative Example 1).

Still further, claim 1 specifies that the cerium(IV) oxide is specifically a cerium(IV) oxide whose particles have a high hydroxyl group activity on the surface and are produced by oxidizing a hydrolyzate of a cerium salt with oxygen. As a result, many hydroxyl groups (i.e., =C-OH) are generated on the surface of the cerium(IV) oxide particles. This is achieved by heat treating in an aqueous medium in the presence of an ammonium salt having a non-oxidative anionic component. These hydroxyl groups on the surface of the cerium(IV) oxide particles provide a chemical effect on hydroxyl groups (i.e., -Si-OH) on the surface of the silicon oxide film, thus improving the polishing speed. See specification at paragraph [0046]. The resultant specific cerium(IV) oxide particles provide improved chemical and mechanical effects to a glass hard disk that is to be polished.

These benefits are not taught or suggested by the cited references.

B. Kasai Does Not Teach or Suggest the Claimed Invention

The Office Action asserts that Kasai discloses a process for producing cerium(IV) oxide; Yoshida discloses that ceria slurries are useful for polishing magnetic discs, and

Khaladji discloses a highly pure cerium oxide. The Office Action thus asserts that it would have been obvious to combine the reference and thereby practice the claimed invention. Applicants disagree.

Kasai discloses a process for producing crystalline ceric oxide particles having a particle diameter of 0.005 to 5 micron, which comprises reacting a cerium (III) salt with an alkaline substance in an $(OH)/(Ce^{3+})$ molar ratio of 3 to 30 in an aqueous medium in an inert gas atmosphere to produce a suspension of cerium (III) hydroxide, and blowing oxygen or a gas containing oxygen into the suspension at a temperature of 10 to 95°C and at an atmospheric pressure. Abstract. Kasai discloses that cerium oxide is used for polishing a silicon oxide film or a semiconductor device, quartz glass for a photomask, quartz crystal such as for a crystal oscillator, and the like.

According to Kasai, the cerium (IV) oxide is beneficial in improving polishing speed. However, as is known by those skilled in the art, surface smoothness is another important factor when polishing glass hard discs. Although Kasai asserts improved polishing speed, Kasai is silent with respect to surface smoothness provided by the polishing slurry. Kasai is thus distinct from and does not teach or suggest the claimed invention. In particular, Kasai does not teach or suggest that the polishing method is specifically used for polishing a glass hard disk platter, and does not teach or suggest the surface smoothness provided by the slurry.

Another important property in polishing slurries is the material itself. Kasai also does not teach this factor. In particular, according to the claimed invention, the slurry material is particularly defined and selected, in addition to providing the good polishing speed and surface smoothness. That is, the surface property of the abrasive compound is that the compound is provided with many hydroxyl groups (-Ce-OH) on the surface of the cerium(IV) oxide particles, and by affecting a chemical effect on the hydroxyl groups (-Si-OH) on the surface of the glass hard disc. See specification at paragraph [0046]. In order to provide the surface effect, the proportion of cerium expressed as a ratio of (cerium oxide)/(cerium oxide +

other rare earth oxides) in the cerium(IV) oxide particles is 95% or more based on weight.

Kasai does not teach or suggest the specific cerium(IV) oxide slurry that is claimed. Kasai does not teach or suggest that a proportion of cerium expressed as a ratio of (cerium oxide)/(cerium oxide + other rare earth oxides) in the cerium(IV) oxide particles is 95% or more based on weight. As shown in the Examples and Comparative Example of the instant specification, the ratio of cerium oxide can vary drastically, and thus the claimed ratio is not inherent in the teachings of Kasai. Nor does Kasai teach or suggest the specific claimed cerium(IV) oxide, or the method by which it is made.

In the absence of any express teachings of the claimed ratio or the specific cerium(IV) oxide, Kasai cannot teach or suggest at least these features of the claimed invention. Kasai does not teach or suggest that varying this ratio to 95% or more and providing the specific cerium(IV) oxide would have any beneficial effects, and thus it would not have been obvious to modify Kasai to practice the claimed invention.

Further, Kasai does not teach or suggest that the slurry further includes a quaternary ammonium ion ($NR_4^+$, where R is an organic group) in a ($NR_4^+$)/( $CeO_2$) molar ratio in a range of 0.001 to 1. Such a quaternary ammonium ion increases stability of the slurry, and leads to a lowering of the average surface roughness after polishing. Kasai does not teach or suggest that such benefits could or would be provided by adding such a quaternary ammonium ion.

C. Yoshida and Khaladji Do Not Overcome the Deficiencies of Kasai

Yoshida is cited for the assertion that ceria slurries are known for polishing glass hard discs, and Khaladji is cited for the assertion that high purity starting materials are desired for ceria polishing slurries. However, these disclosure do not remedy the failure of Kasai to teach or suggest all of the limitations of independent claim 1.

Yoshida discloses a cerium oxide abrasive with which the surfaces of substrates such as $SiO_2$ insulating films can be polished at a high rate without causing scratches. The

abrasive comprises a slurry comprising cerium oxide particles whose primary particles have a diameter of from 10 nm to 600 nm and a median diameter of from 30 nm to 250 nm and slurry particles have a median diameter of from 150 nm to 600 nm and a maximum diameter of 3,000 nm or smaller, the cerium oxide particles being dispersed in a medium. Abstract.

However, Yoshida does not teach or suggest that the polishing method is specifically used for polishing a glass hard disk platter. Nor does Yoshida teach or suggest that a proportion of cerium expressed as a ratio of (cerium oxide)/(cerium oxide + other rare earth oxides) in the cerium(IV) oxide particles is 95% or more based on weight. Yoshida merely discloses cerium oxide used in glass-surface polishing for photomasks, and entirely fails to teach or suggest the proportion of cerium in the total rare earth elements in an abrasive compound. As shown in the Examples and Comparative Example of the instant specification, the ratio of cerium oxide can vary drastically, and thus the claimed ratio is not inherent in the teachings of Yoshida. Nor does Yoshida teach or suggest the specific claimed cerium(IV) oxide, or the method by which it is made.

Although Khaladji may disclose that high purity ceria starting materials are desired, Khaladji does not teach or suggest the specific limitations of claim 1 with respect to the production of the claimed cerium(IV) oxide slurry. The Office Action argues that high purity would be desired, because it would lead to less introduction of impurities into the process. However, the references do not specifically teach or suggest the claim limitations, and thus cannot have rendered those limitations obvious.

Nor does Khaladji teach or suggest the beneficial polishing properties that are provided by the claimed invention, and demonstrated in the present specification.

D. Conclusion

For at least these reasons, the claimed invention would not have been obvious over the cited references. The references fail at least to teach or suggest the claimed method for

polishing a glass hard disk platter. Nor do the references teach or suggest a stable slurry containing cerium(IV) oxide particles wherein a proportion of cerium expressed as a ratio of (cerium oxide)/(cerium oxide + other rare earth oxides) in the cerium(IV) oxide particles is 95% or more based on weight, as claimed. The references also fail to teach or suggest the specific claimed cerium(IV) oxide, or the method by which it is made.

Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

III. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of the application are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

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